

THE ENVIRONMENTAL IMPACT OF A PRINTING PLATE

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Contents

	Page
List of Figures	ii
1.0 Introduction	1
2.0 Sources of Waste	2
3.0 Methodology	3
4.0 Technologies	4
4.1 Conventional chemically processed	4
4.2 Reduced chemistry	5
4.3 “Chemistry-free”	6
4.4 Processless	6
5.0 Resources used	7
5.1 Chemistry	7
5.2 Water	8
5.3 Energy	9
5.4 Waste	10
6.0 Summary	11

List of Figures

	Page
Figure 1: Sources of Waste	2
Figure 2: Indirect Manufacturing Resources Used	3
Figure 3: Conventional Chemical Processing	5
Figure 4: Processless	6
Figure 5: Chemistry Use	7
Figure 6: Water Usage	8
Figure 7: Energy Use	9
Figure 8: Waste Generated	10

1.0 Introduction

Printers around the world increasingly are paying attention to lessening the environmental impact of their operations. All the evidence indicates an increased awareness of and concern with environmental considerations. The impetus comes from a variety of sources. Owners want to be good citizens. Governments are focusing more on environmental compliance and reduction of emissions and waste. Customers are demanding “green” policies and procedures. Even aside from these societal pressures, there are still very good reasons for printers to focus on improving operations and reducing waste. Simply put, waste of any type does not add value. Reducing it means increasing efficiency, shortening turnaround time, and lowering costs.

Many printers have delayed tackling the issue of the environment. A print operation has many processes, and addressing them all can be overwhelming. It is therefore sometimes best to begin by taking an incremental approach and concentrate on those processes where it is possible to make improvements that have an immediate impact and that will save money right away.

One process that has received a great deal of attention, and that all printers can focus on, is that of plates and plate making. A printer needs to look at all areas of the operation to reduce the environmental impact, and plates are no exception. All major plate suppliers have made great strides in reducing the amount of chemistry and waste required to process offset lithographic printing plates.

That said, a number of claims are being made, and there is a great deal of confusing information. This report is an attempt to bring some clarity to the issue.

While environmental considerations are only one factor in choice of a plate, it is important to be aware of the differences and the amount of chemistry and other waste involved. Even if the result is not a change in plates used, an awareness of and improvement in processes and procedures is possible. It is important to remember that virtually all plates work well in the correct application, and no single solution is appropriate for every printer. Plates have different characteristics on press, different run length capabilities, and are not suitable for all applications.

In reading this paper, comparisons can be drawn in two ways. First, one can compare the relative environmental impact *between* different categories of plates. Second, one can compare resources used by different plates *within* a category.

2.0 Sources of Waste

Processing of plates consumes three primary resources: chemistry to develop or process the plates, energy to run the processing unit, and water to rinse the plate, dilute the chemistry, or clean the unit. Similarly, processing generates waste which must be disposed of, in the form of spent chemistry, waste water, and containers. Some plates, such as silver-based violet plates, also require a silver recovery system. Each plate type and process consumes different amounts of these resources, depending on the imaging laser, emulsions used, and chemical and physical reactions required to develop or wash-up the plate.

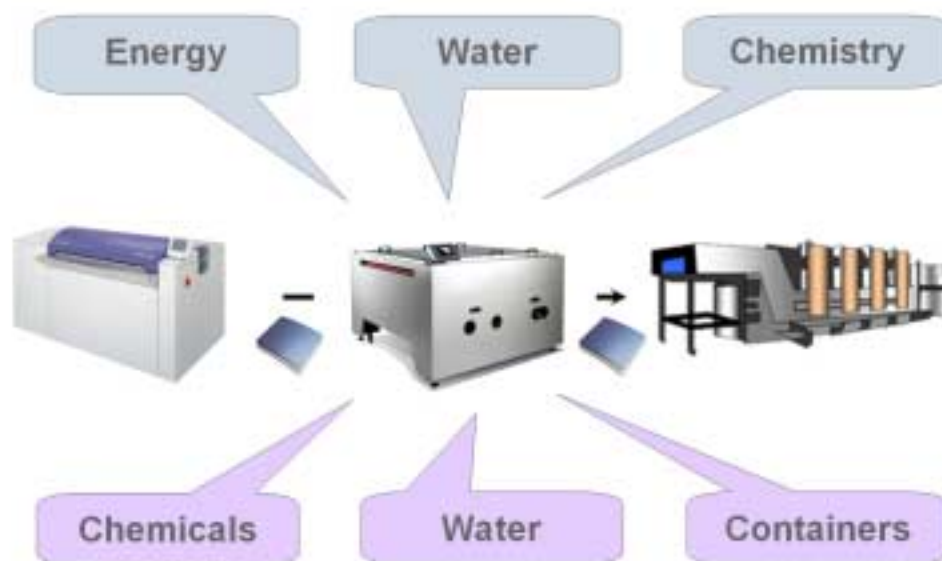


Figure 1: Sources of Waste

In addition to the direct resources used in the processing of plates, there are indirect resources used. Plates and processors must be manufactured and delivered, all of which require materials, energy, and water. Each of these also has a carbon footprint. We will discuss the environmental impact of this indirect manufacturing process in another paper.

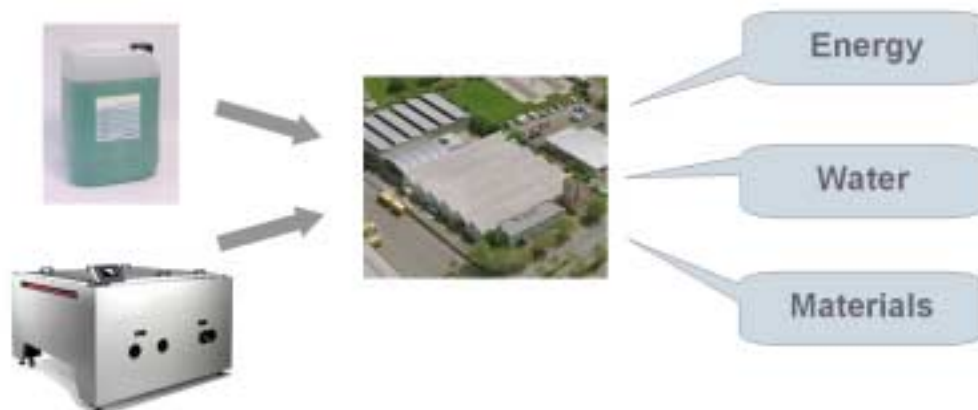


Figure 2: Indirect Manufacturing Resources Used

3.0 Methodology

We examine selected plates from each of the major manufacturers, Fujifilm, Kodak, and Agfa, including, as appropriate, thermal, violet, and low or no chemistry plates, including processless. For Fujifilm and Kodak plates, we relied on published product specifications, supplemented by customer information where available. As Agfa declined to participate, we relied on published specifications, which we spot-checked with customer data. We then used that information to calculate resource use.

To provide some level of consistency, we made the following operational assumptions:

- 8-page printer (B1, 40" press, plate size 1030mm x 790mm)
- 1000 square meters (approximately 1,200 plates) per month
- Processing 4 hours per day, standby 8 hours per day
- 5 day week (22 working days per month)
- Typical operation

So, for example, if the manufacturer's specification is to change chemistry in the processor every two weeks, that means the initial processor loading would be able to process 600 plates before changing the chemistry. Similarly, replenishment rates are based on published specifications. In those cases where there are no significant differences among plates, for example power consumption of the processor, or water usage, we assumed similar results. While the exact numbers will vary depending on each plant's specific situation, plate volume, and practice, the results should provide a guideline for comparison.

4.0 Technologies

There are a number of different technologies available for digitally imaged plates. While digital plates are typically viewed in terms of imaging requirements, one can also categorize them in terms of resource use and waste generation. There are essentially three or four major categories:

1. Conventional chemically processed
2. Reduced chemistry
3. “Chemistry-free”
4. Processless

Within each, there are a number of sub-categories, options, and practices, for example imaging technology (thermal or violet), or water usage practices and requirements.

Each of the major plate manufacturers offers a variety of options within each of these broad categories. In this report, we examined the following:

4.1 Conventional chemically processed

There are two main technologies for conventional chemically processed digital plates, using thermal or violet (visible light) lasers. After imaging, these plates need to be processed with chemistry in a processor. Violet plates tend to use more chemistry than do thermal plates. Within each of these broad categories, however, chemistry consumption is essentially similar across manufacturers. This category is most sensitive to assumptions and plate volumes. The amount of chemistry used depends on the size of the processor; developer needs to be replenished to maintain proper strength; and it must be changed based on volume and time.

In this category we included thermal plates from Agfa (Energy Elite); Fujifilm (Brillia HD LH-PJ/PL); and Kodak (Sword Excel and Electra), and the violet Agfa Lithostar Ultra LAP-V.



Figure 3: Conventional Chemical Processing

4.2 Reduced chemistry

This category is characterised by clever plate or processor design which helps to reduce chemistry usage. There are a number of options for chemistry reductions, including the use of “intelligent processors”, such as the Fujifilm FLH-Z ‘ZAC’ processor with the Brillia HD LH-PJ/PL plate, or a reduced chemistry plate, such as the Agfa :Amigo. With an intelligent processor, the replenishment system delivers the correct chemistry and water solution according to the activity of the developer bath. This provides longer developer life with consistently higher quality and a concomitant slight reduction in chemistry and waste. The Agfa :Amigo plate uses “ThermoFuse” technology, the same as the “chemistry free” :Azura. Agfa positions the plate as a reduced chemistry option rather than chemistry-free. We can see, however, that its chemistry usage is nearly as high as that of conventionally developed Fujifilm and Kodak thermal plates, and higher than those plates using an intelligent processor. (Kodak also offers an optional “Chemical Conservation Unit” for their preheat plate products, offering up to 40% savings on chemical usage for high-volume plate users. However, the chemistry savings from that unit are not shown in the numbers compared in this report.)

4.3 “Chemistry-free”

Chemistry-free solutions require post-imaging processing or finishing before mounting on press. The most common of these require a finishing solution or gum to fix the plate image prior to being used on-press. Here, we look at the Agfa :Azura thermal plate and the violet Fujifilm Brillia HD PRO-V (also known as EcoMaxx-V in some regions) both of which use a finishing solution rather than a traditional chemical developer. As the chart indicates, both use less chemistry for this process than either the reduced chemistry or conventional options, but more than processless plates.

4.4 Processless

Finally, we examine the option of processless plates, looking at two thermal solutions, the Fujifilm Brillia HD PRO-T (also known as EcoMaxx-T in some regions) and Kodak Thermal Direct. As both are developed on press, they involve neither additional chemistry nor a processor.

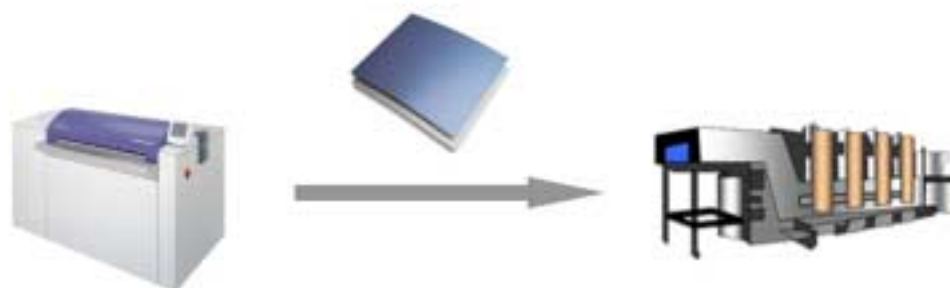


Figure 4: Processless

5.0 Resources Used

All plates use resources in their development that have an impact on the environment. The major resources include chemistry for processing, water, and energy. Plate processing also affects the ambient air through, for example, the release of VOCs. This paper focuses on chemistry, water, and energy, and the waste resulting from their consumption.

5.1 Chemistry

Most digital plates require the use of chemistry for development or washout. There are nevertheless a variety of options available to reduce the amount of chemistry used, including intelligent processors, reduced chemistry plates, and processless plates.

As the following chart shows, conventionally developed plates use the most chemistry, followed by reduced chemistry options, 'chemistry-free' plates, and processless plates.

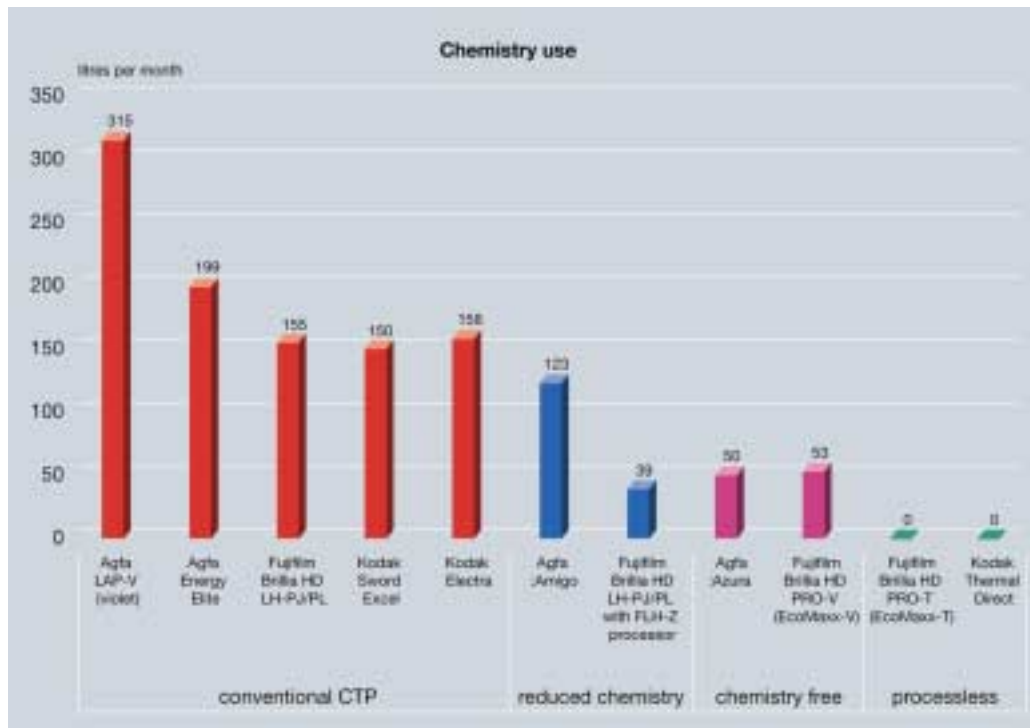


Figure 5: Chemistry Use

5.2 Water

Plate processing uses water both to wash the plate and, in some cases, dilute the chemistry. Water is a scarce resource in many geographies; many systems allow for water to be recirculated. This requires water to be of a certain purity. Many printers purify their water through reverse osmosis or other methods and can thus use recirculating systems. Another important factor to consider is how often each plate type can be used with recirculation. Printers should investigate this when making their decision, based on their local water situation and choice of plate and processor.

As can be seen from the following chart, water recirculation is particularly beneficial for conventionally developed plates. Intelligent processors also use less water, even though additional water is required to dilute the concentrated chemistry. Chemistry free and processless plates use little if any water.

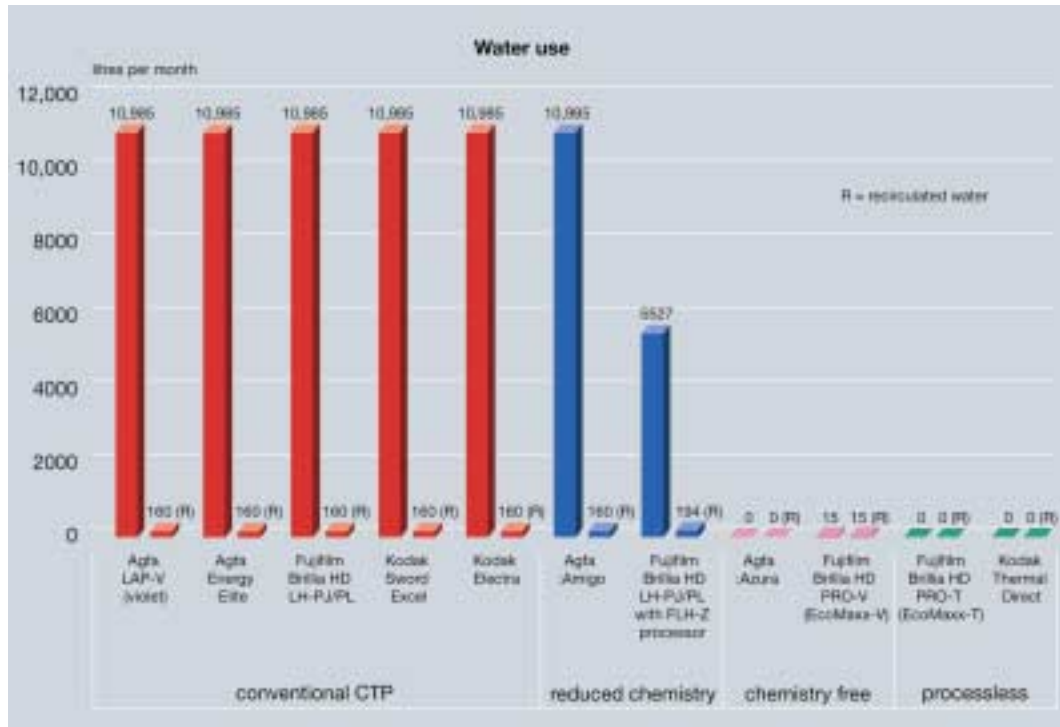


Figure 6: Water Usage

5.3 Energy

Plate processors all require energy to operate. The most power is used in the working mode, when the plate is being developed or processed. However, the processor also requires power during the non-processing times, to keep the temperature ‘ready’ for processing, and somewhat less in ‘sleep’ mode. In our example, this would be weekends and nights. As the following chart shows, there are very few differences in power consumption by plate. Violet processors tend to have slightly higher energy consumption as they are more powerful to accommodate the pre-heating requirements of violet plate processing. (Plates that require baking naturally use much more energy for the baking oven. Ovens can use 24 kilowatts or more per hour of operation.) The Agfa :Azura is not-temperature sensitive. Its wash unit therefore requires less power and uses less energy. With no processor, processless plates consume no additional energy for development. While it should be noted that the total energy costs for a processor may be relatively low, it is an example of the ability to make small, incremental cost savings and reductions in resource consumption and carbon footprint.

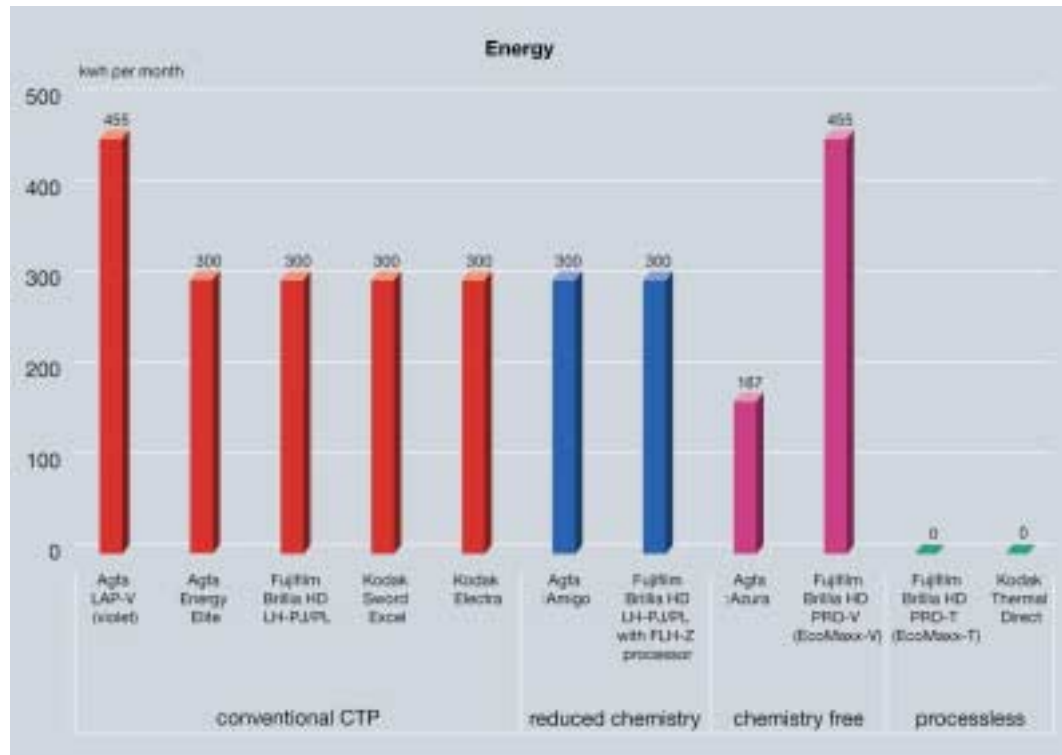


Figure 7: Energy Use

5.4 Waste

All of these resources need to be disposed of after use. For most systems, this is essentially chemistry and the empty containers. The amount of waste generated closely tracks the amount of chemistry used, except in those cases where chemistry is diluted.

Depending on local regulations, water can be treated and disposed of safely. For silver-based plates from Agfa and others, a silver recovery system is required before the waste can be disposed of locally, again depending on local environmental guidelines. The environmental impact of and legal requirements and liability for disposing of chemistry and even wash-water for your particular region should be investigated as part of the analysis for each plate solution you consider.

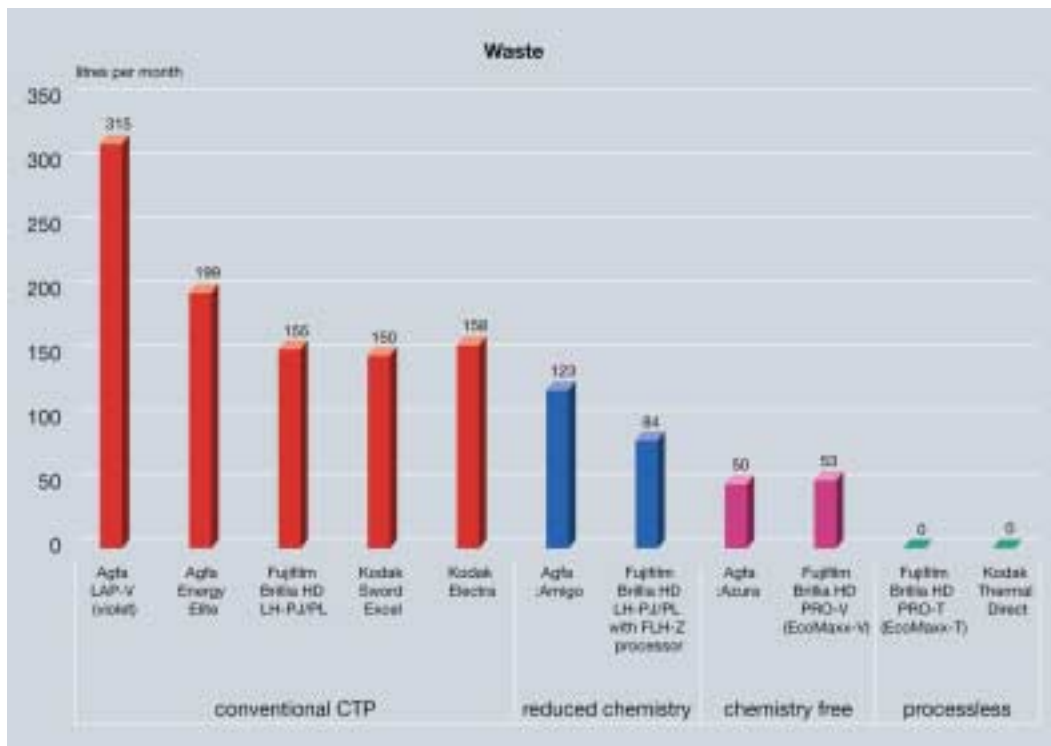


Figure 8: Waste Generated

6.0 SUMMARY

Printers are rightfully concerned about lessening the environmental impact of their manufacturing operations. There are a variety of high quality plates that meet printers' requirements. Environmentally-conscious printers can make a more informed decision by looking at the amount of chemistry, water, and energy required by each. In addition to conventionally processed plates, there are a variety of reduced chemistry options. For those whose operations allow, there are also "chemistry-free" plates and processless plates that further reduce the environmental footprint. While performance on press will remain a key factor in plate selection, we hope the information presented here will enable printers to take into account the environmental impact of their decision.

ABOUT J ZARWAN PARTNERS

J Zarwan Partners is an independent consultancy that specializes in business development, market strategy, and product planning and positioning. John Zarwan, its founding partner, is internationally known for his knowledge and independent perspective. His 2003 paper *CTP Platemaking: Understanding the Real Costs*, was the first attempt to quantify the cost of chemistry. Prior to founding J Zarwan Partners, Dr. Zarwan was principal of State Street Consultants and held senior management positions in finance, marketing, and product management at NEC and Agfa (Compugraphic). Dr. Zarwan is an alumnus of Grinnell College, Stanford University, Yale University, and the Stern School of Business of New York University and was on the faculty of the College of Charleston, the University of Wisconsin-Madison, and the University of Prince Edward Island, where he currently teaches marketing.

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